

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

THE CALIFORNIA PLETHODONT SALAMANDER,
ANEIDES FLAVIPUNCTATUS (STRAUCH), WITH
DESCRIPTION OF A NEW SUBSPECIES AND NOTES
ON OTHER WESTERN *ANEIDES*

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The Santa Cruz Mountains, a section of the outer Coast Range of California, form the backbone of the peninsula which confines the southern arm of San Francisco Bay. These mountains are highest and most rugged in the Big Basin Area north of the city of Santa Cruz; they narrow and lose height northward towards the city of San Francisco, which rests on the tip of the peninsula. The Santa Cruz Mountains form practically the southernmost end of the wet coastal redwood (*Sequoia*) belt and therefore mark the southern end of the range of a number of vertebrate species, among these being the salamanders, *Dicamptodon ensatus* and *Aneides flavipunctatus*. The purpose of this paper is to discuss the latter, to distinguish its southern race, and, incidentally, to discuss other western forms of the genus.

Comparatively little has ever been published on *Aneides flavipunctatus*, and almost all of this is contained or summarized in the papers of Cope (1889, pp. 187-189), Van Denburgh (1895), Storer (1925, pp. 119-124), Dunn (1926, pp. 220-223), Slevin (1928, pp. 66-69), Myers (1930, pp. 60-61), and Bishop (1943, pp. 336-339). The entire range of the animal is within the state of California, extending from the Santa Cruz Mountains northward through the coastal region to Shasta and Humboldt Counties. It is in the southern segment of the range that naturalists have most frequently seen the species. Generations of Stanford zoology students, beginning with Van Denburgh, have roamed the nearby habitat of *A. flavipunctatus* and have become familiar with the animal and its habits. Little was known of the populations to the north of San Francisco Bay previous to the last fifteen years, but Wood (1936 and 1939) has published some notes on northern examples. Both of the present writers have collected *flavipunctatus* in the south and in the north, and the senior author recognized differences of the southern and northern populations over 18 years ago. Later, he examined the specimens in the California Academy and the Stanford Natural History Museum collec-

tions, and (in MS.) tentatively separated the southern race. When the junior author became his student at Stanford, a collaborative study was begun, which resulted in the present paper.

A. flavipunctatus is a very distinctive species, not closely related to any other. Within the genus *Aneides* it is in no sense a vicarious (allopatric) form, but widely overlaps the ranges of *A. lugubris* and *A. ferreus*, with neither of which it intergrades or is easily confused. Its elongate form, short legs, thick tail, and black or blackish color distinguish it sharply from the other three species of the genus.

Almost the only author who has discussed the relationships of *flavipunctatus* is Dunn (1926, p. 25). He says, in part: "In the genus as a whole, there is a fairly clear line of evolution from *acneus* through *ferreus* to *lugubris*, with *flavipunctatus* as an aberrant offshoot from some form more primitive than exists today in the West." The authors do not entirely agree with Dunn and offer their own conception of the relationships.

Both *acneus* and *flavipunctatus* have unflattened jaw teeth, while *ferreus* and *lugubris* have them flattened. The latter type of dentition is undoubtedly the more specialized, and Dunn has placed considerable faith in this specialization as a phylogenetic indicator. While agreeing that the character is important, it is nevertheless worth pointing out that the presence of a single specialization, or the retention of a more primitive type of the same organ, in a genus which must have had a long history and now possesses but four species, may be misleading if it is depended on too heavily as an indicator of relationship among the living species.

Adults of *flavipunctatus* resemble those of *lugubris*, and differ from large *ferreus* and *acneus*, in several characteristics—the greatly swollen temporal muscles (especially in males), the robust and almost round body, the heavier tail, more robust legs, the smaller eyes, the type of coloration (a plain ground-color with a sprinkling of small discrete spots versus a ground-color largely obscured by greenish, grayish, or brassy marbling), the more highly developed "smiling" contour of the jaws, and a stronger tendency to remain on the ground and not to climb, at least in most habitats. It has not been generally recognized that this last is a characteristic of *lugubris*, in spite of the fact that it does occasionally climb oaks and breed in them. It is probable that *lugubris* breeds on the ground more often than in trees. *A. acneus* and *ferreus* are inveterate climbers, *lugubris* somewhat less of a climber, and *flavipunctatus* a ground dweller. In any event, the set of characters mentioned above appears to indicate a much closer relationship between *lugubris* and *flavipunctatus* than Dunn was inclined to postulate. On the other hand, Dunn and others have indicated the similarity of *ferreus* to *acneus*, and these two animals, one on the Pacific coast, the other in the Appalachians, are remarkably alike. They seem to be more closely related, phylogenetically, than either is to *lugubris* or *flavipunctatus*. Naturally, it must be recognized that the set of adult characters which set *flavipunctatus* and *lugubris* apart are mostly not evident in the young, which greatly resemble both the young and the adults of *ferreus* and *acneus*. It is possible that we have here one of those not uncommon instances of "arrested development," in which some of the species of a genus never attain certain characteristics shown by the adults of other congeners. Neither *ferreus* nor *acneus* reach as great a length as *flavipunctatus* and

lugubris. Despite the possibility that the chief differences between these two pairs of species may be largely a matter of developmental physiology, the authors believe that each represents a rather different evolutionary line, that Dunn's assumption of close relationship between *lugubris* and *ferreus* is at least questionable (Dunn, 1926, pp. 210 and 219), and that *flavipunctatus* is not necessarily a descendant of an *Ancides* "more primitive than exists today in the West" (Dunn, 1926, p. 25), if other characteristics besides the flattening of the jaw teeth are considered in determining what is "primitive."

Continuing our discussion of *flavipunctatus*, it may be noted that this salamander is more hydrophilous than *lugubris* or *ferreus*. It is the only *Ancides* which we have found in water under stones along the edges of a brook, in a habitat similar to that of *Desmognathus fuscus* (Los Gatos Creek, Santa Clara Co., and near Felton, Santa Cruz Co.). North of San Francisco Bay, we have seen it in shaly rock-slide seepages, and our material from Clear Lake was taken in a dripping wet pile of rocky rubble at the end of a horizontal mine shaft. At Waddell Creek, adults and young were found on a dark, misty afternoon under wet boards and sticks on the flat land near the creek. The animal appears to forage at night, for in the forest between Guerneville and Trenton, Sonoma Co., examples were taken at night, in the rain, when they were walking about in the open.

Neither *lugubris* nor *ferreus* is found commonly in such wet habitats as seepages, piles of dripping stones, or the edges of brooks. The former species is usually taken under bark, boards, or other debris on the ground, and usually in much drier surroundings, even during rain. One example taken during wet weather from beneath leaves and humus half-way up the trunk of a palm may have been attempting to escape greater moisture on the ground. In the dry season, the open-land *lugubris* ordinarily retreats into the deep cracks in the ground occasioned by the drying of the top-soil (whence they may often be driven during the summer by prolonged running of water from a garden hose into such cracks), whereas *flavipunctatus*, more a forest species, appears to congregate near springs and brooks. The senior author has found *ferreus* to be most easily found, during the wet season, by looking for felled logs (never redwood) which have not begun to rot, but from which the bark of the butt-end has begun to loosen. During the daytime, almost every such log seen along the Redwood Highway harbored one or two *ferreus*, peering out from just within the shadow of the bark on the upper side of the log. Such "ferreus logs" could easily be "spotted" from a moving automobile. Few examples were found under bark or boards on the wet ground, and none in soggy rotten logs or beneath the bark of inclined logs whose fall had been arrested by other trees. The preferred habitat seemed to be the driest one available which would still shelter the beast, prevent desiccation, and allow free space for rapid retreat. Parenthetically, it may be said that the retreat is lacertilian in speed; *flavipunctatus* is much slower in escaping, whereas *lugubris* is almost invariably the most sluggish of all western salamanders.

In distribution, *flavipunctatus* is nearly always found only in forested country, even though the microhabitat may not be shaded. Probably this is correlated with this salamander's need for moisture, and deforestation may have greatly restricted its range. Southward, the species is

almost entirely confined to the fog belt of the outer Coast Range and Bishop's map (1943, p. 233) errs greatly in extending the southern range over twice as far inland as the animal is found. The species does not occur east of San Francisco Bay, and is not even found in the lowlands west of the Bay. It is possible that Dunn's records for Palo Alto and Mountain View (Dunn, 1926, p. 223) were based on old examples taken before well-pumping had reduced the underground water-table and desiccated the west-bay lowlands, but it is our opinion that the species was not, within historic times, found here. One must go to the foothills of the Santa Cruz Mountains, four or five miles west of Stanford, Palo Alto, and Mountain View, to reach the habitat of *flavipunctatus*. On the other hand, *lugubris* is much rarer in the coastal fog belt than it is inland, in drier country.

One more characteristic of *flavipunctatus*, shared also with *lugubris*, deserves mention. Individuals confined together frequently bite each other severely, their teeth leaving great gashes in the skin (Myers, 1930, p. 61). Although we have no personal observations to record for *flavipunctatus*, *lugubris* should not be held too tightly in the collector's hand; the senior author has been severely bitten by a half-grown *lugubris* so held, so severely that a bandage was necessary to stanch the flow of blood. Presumably *flavipunctatus*, with its strong jaw muscles, could bite as strongly. No *ferreus* has been observed to bite another, or the collector.

Aneides flavipunctatus was apparently first named by Strauch in 1870, but the correct application of this name was not recognized until Storer (1925) showed that it seems to refer to the present species. We have not seen the original, but Storer reprints Strauch's description *verbatim*. Strauch's type locality is given as "*Californien (Neu-Albion)*" and the type was collected by Wosnessensky. In a footnote (p. 120) Storer mentions that Dr. E. C. Van Dyke says Wosnessensky was in California in 1840 and 1841 and collected mainly at old Fort Ross, Sonoma County, at New Helvetia ("Sutter's Fort," now Sacramento), and at San Francisco. Storer and, following him, other modern writers, have stated that Wosnessensky probably got the type of *flavipunctatus* somewhere in Sonoma County.

It will be recalled that "New Albion" (or better, "Nova Albion") was the name bestowed upon coastal California in 1579 by Sir Francis Drake, when he landed at some as yet unidentified spot (most probably the modern Drakes Bay) north of San Francisco and took possession of the land in the name of Queen Elizabeth. He affixed an inscribed brass plate, bearing, among other things, the name "Nova Albion," upon a "faire great poste" in token of his deed, and this is duly recorded in Hakluyt's *Voyages* and elsewhere. The name "New Albion" was thus widely known, if unused, although the plate was lost sight of until its dramatic reappearance in 1936. It had been found in 1933 a mile and a half inland from Drakes Bay, and discarded by its finder near San Quentin, where it was rediscovered in 1936 by a picnicker and brought by him to the University of California.¹ It is therefore evident that "New Albion" referred to a land of indefinite extension and it remains

¹For the history of Drake's plate, see Calif. Historical Soc. Quarterly, vol. 16, no. 1, part 2 (special issue, "Drake's Plate of Brass"); also pp. 192, 271, and 275 of the same volume; and vol. 17, no. 4, part 2 (special issue, "Drake's Plate of Brass Authenticated").

to be seen if the collector of the types of *flavipunctatus* so applied it.

Dr. E. C. Van Dyke, of the California Academy of Sciences, has referred us to the excellent account of Wosnessensky in Essig (1931, pp. 777-789). Ilya Gavrilovich Wosnessensky, also spelled Vosnesensky (1816-1871), was a zoological collector for the Academy of Sciences in St. Petersburg, who collected, among other things, the types of *Salamandrella wosnessenskyi* (Strauch). Essig quotes Wosnessensky's own brief account of his sojourn in California, during which time (July 20, 1840 to September 3, 1841) the Russian traveller was the first to climb and name Mt. St. Helena, in what is now the northwestern tip of Napa County. Wosnessensky says, in part: ". . . I left New Archangel July 7th and reached the coast of New Albion, the Ross Colony [Ft. Ross, Sonoma County], July 20." From this statement it is evident that Wosnessensky used "New Albion" as a general name for the area of coastal Alta California north of San Francisco, and there is nothing to show that he did not include the whole block of territory north of San Francisco Bay, perhaps even as far inland as New Helvetia (Sutter's Fort, now Sacramento). The three types of *flavipunctatus* might have come from anywhere in Sonoma County or from Napa County, and the fact that they bore large whitish spots indicates strongly that they did not come from the immediate coastal area at Bodega or Ft. Ross, where the species appears to bear only small spots, if any at all. Our guess is that the place of collection was rather far inland, perhaps near Mt. St. Helena, since the nearest approach to the coloration described by Strauch, among the Stanford material of the species, is seen in Clear Lake examples (in mine shaft on border of Clear Lake, one half mile northwest of Lucerne). Incidentally, it would appear to be strange that Strauch chose the name *flavipunctatus* (yellow-dotted) since he describes the spots as "whitish," but he says that this is so only in the two specimens from which the "epidermis is stripped," and that in the one in which the epidermis is "present in places," the spots are light brownish yellow. In live examples the spots, when present, are usually bluish white to pale cream in color. They are never yellow, in our experience.

Strauch (see Storer, pp. 121-122) says that his *flavipunctatus* is "überall tief schwarz gefärbt und mit recht grossen, unregelmässig geformten und gestellten weisslichen Makeln verziert." Cope (1883, pp. 24-25) says that the type of his nominal species *Plethodon iëcanus* "is black everywhere, and the superior surfaces are dusted over with minute white flecks." Cope's type was from Baird (the old U. S. Fish Commission Station), McCloud River, Shasta County, and subsequently collected specimens from the same place are said by Cope (1889, p. 188), to have the superior surfaces and sides of the head, body, and tail dusted rather thickly with small subequal bluish-white spots, much as are seen in *Plethodon glutinosus*. Baird forms perhaps the most northeasterly limit of the range of *flavipunctatus*, and the point at which the species extends farthest inland. (Baird is now flooded by Shasta Dam.)

The senior author (Myers, 1930, p. 60) noted that all adults south of San Francisco Bay are unspotted. Unspotted examples also exist north of the Bay, but these appear to be restricted chiefly to the coastal fog or redwood belt. Mr. Leo Shapovalov of the California Division of Fish and Game, at Stanford, long ago discovered that some half-grown and adult northern unspotted specimens from the redwood area are distinctly

greenish in color, but we can add that only young examples from south of the Bay ever exhibit any greenish color. On the other hand, the majority of northern adults possess spots, and those from farthest inland are usually the most heavily spotted.²

Both of the writers are opposed to excessive subspecific splitting. Animals usually are distributed in more or less isolated colonies of varying size and composition, and the larger, recognizably different populations are usually compounds of smaller and often recognizably different ones. Splitting of these nomenclaturally could go on almost *ad infinitum*. However, we feel that the southernmost population of *A. flavipunctatus* is a recognizable entity worthy of subspecific recognition. For one thing it is completely cut off, geographically, from the northerly populations by San Francisco Bay. In spite of this we recognize that certain coastwise populations north of the Bay are very similar to the southern animals, but the time at our disposal has not allowed a complete enough study of the entire species to determine whether some of the northern coastal *flavipunctatus* ought to be referred to the southern race we are describing.

Aneides flavipunctatus niger, new subspecies

Holotype.—Stanford Natural History Museum 2938; from near the forks of Waddell Creek, Santa Cruz County, California; collected on March 17, 1929, by G. S. Myers and the late Merrill W. Brown. This is the 152 mm. specimen recorded by Myers (1930, p. 60); it is now 150 mm. in total length. The specimen is unique in having lost the right fore-foot.

Paratypes.—262 specimens, as follows:

Natural History Museum of Stanford University, Amphibian Nos. 8, Los Gatos, Santa Clara Co.; 68-70, 72-74, Stevens Creek, Santa Clara Co.; 843, Mountain View, Santa Clara Co.; 898-899, Boulder Creek, Santa Cruz Co.; 1642-1643, Murphys Creek, north of Mt. Madonna, Santa Clara Co.; 2718, 2939-2940, same data as holotype; 2810-2823, Los Gatos Creek, 3 to 4 miles west of Los Gatos, Santa Clara Co.; 3726, Felton, Santa Cruz Co.; 4126-4137, Skyline Boulevard, 5 miles south of junction with present La Honda Road, San Mateo Co.; 4471-4472, near Alpine Creek, San Mateo Co.; 5220-5221, tributary of Campbell Creek, at Long Bridge, Santa Clara Co.; 6405, Skyline Boulevard, 2 miles north of junction with old Saratoga Road, Santa Cruz Co.; 6527-6531, Stevens Camp, off Waddell Creek, Santa Cruz Co.

California Academy of Sciences Nos. 13363, 13385-13395, 13409-13414, 20994-20996, 33396, 40462-40467, 53977-53979, 53995-53996, 63779-63792, 63798, all from Los Gatos, Santa Clara Co.; 80293-80297, 81324-81336, Congress Springs,, Santa Clara Co.; 80328-80337, 81312-81323, 2 miles west of Felton, Santa Cruz Co.

University of California, Museum of Vertebrate Zoology Nos. 8261, Los Gatos, Santa Clara Co.; 12207-12208, 20 miles southwest of San Jose, Santa Clara Co.; 13801-13806, 16052-16053, Ben Lomond, Santa Cruz Co.; 18002-18003, Head of Mindayo Creek, San Mateo Co.; 27805-27858, 1½ miles west of Felton, 1000 ft., Santa Cruz Co.

²Since our paper was completed, Hilton (1948) has recorded, as *Aneides flavipunctatus*, a peculiar salamander from the Mt. Hood region of Oregon. Judging solely by Hilton's description and figure, we believe this to represent a new species, well distinguished from *flavipunctatus*.

University of Colorado Museum Nos. 1335.1-1335.19, Congress Springs, 1.3 miles west of Saratoga, Santa Clara Co.; 1336.1-1336.2, 4.3 miles west of Saratoga, Santa Clara Co.; 1337.1-1337.3, The Forks, Waddell Creek, Santa Cruz Co.; 1338.1-1338.21, 1 mile west of Felton, 1000 ft., Santa Cruz Co.

Diagnosis.—A form of *Aneides flavipunctatus* in which the color of half-grown and adult examples is invariably a shiny black (hence the name *niger*, shining black) without light spots or speckling, in which the cloacal lips are black, and in which 90 percent of the individuals measured show a figure of .80 or less in the proportion: length of forelimb plus length of hindlimb divided by distance from armpit to groin.

Discussion.—Aside from the character pertaining to the presence or absence of spots a number of other characters were examined with the intent of determining whether additional morphological differences existed. A number of these characters show significant statistical differences but are of little diagnostic value. Among the characters examined are the following:—

1. Number of costal grooves between fore and hind limbs.
2. Number of costal folds between appressed fore and hind limbs.
3. Body length to anterior edge of cloacal fold.
4. Tail length from anterior edge of cloaca to tip of tail.
5. Head length to gular fold.
6. Head width.
7. Length of forelimb.
8. Length of hindlimb.
9. Relative length of digits.
10. Distance between axilla and inguen.
11. Relative development of the gular fold.
12. Width of the tail at midpoint.
13. Height of the tail at midpoint.
14. Number of vomerine teeth.
15. Disposition of vomerine teeth.
16. Color of cloacal lips.

In the southern form there is a distinct tendency to develop more costal grooves. Here they are thirteen in number with an occasional individual showing fourteen. These counts exclude the half groove dorsal to the inguen. The northern individuals never have more than thirteen grooves, and frequently only twelve are present. Furthermore, half grooves dorsal to the inguen are also unusual. The number of grooves present shows a high correlation with the actual distance between the axilla and inguen. This distance averages about 41 mm. in southern specimens and about 35 mm. in adults of northern individuals. Such data, however, are of little value in identifying individuals, for sexually mature forms vary greatly in size. But because of the difference in axilla-inguen length there is an appreciable difference in the distance between the toes of the appressed limbs. This distance is ordinarily measured in terms of costal folds but because of the size of this unit, differences between northern and southern forms, expressed in terms of costal folds, is diagnostically unsuitable. If this character, however, is described in the form of the ratio, length of forelimb plus length of hindlimb divided by distance between axilla and inguen, a fairly diagnostic character is avail-

able. In 90% of the southern individuals this ratio is less than 80, and in 90% of the northern individuals it is greater than 80.

Other measurable characters showing slight differences of little diagnostic value were also observed. The ratio of head diameter to head length indicates that the southern form has a relatively broader head. This is in part a reflection of the differential development of the masseter muscles. But as this is a sexually dimorphic character it loses much of its value for diagnostic purposes. There is also a difference in the ratio of the diameter of the tail to the height of the tail measured at a point half way to the tip. This averages greater in southern forms. The character, however, is not reliable in diagnosing individuals, for large specimens tend to have rounder tails, and the shape of the tail varies considerably with the condition of the specimen.

An additional color character difference exists which has some diagnostic value. As the character is a relative one it is difficult to make use of unless comparative material is available. The lips of the cloaca of northern specimens are white or nearly white while those of southern specimens are black.

It should be pointed out again that the young of both the southern and northern forms are minutely speckled with white, as is usual in the genus *Aneides*. But in addition to this speckled pattern there are color differences of a rather conspicuous nature. These differences are most striking in living individuals. No analysis has been made of these differences for two reasons; living material of both forms has not been available simultaneously; and no satisfactory differentiation has been made as yet between the young of the sympatric species *A. flavipunctatus* and *A. ferreus*.

The name *Aneides flavipunctatus flavipunctatus* is applied tentatively to all of the populations north of San Francisco Bay, but with the express notation that we are doubtful of the systematic status of the coastwise population in Sonoma and more northern counties, which is similar in many respects to *niger*. We consider that material from eastern Sonoma, from Napa, and from Lake counties probably will eventually be considered a separate subspecies, and that the name *Aneides flavipunctatus flavipunctatus* may properly be applied to it. We do not have sufficient material at hand to do more than guess at the status of the far northeastern population to which the name *iëcanus* applies. Certainly it is spotted and certainly it is not identical with *niger*.

Distribution.—The range of *niger* is well illustrated by the localities in the list of paratypes. Briefly, it is delimited by the wooded Santa Cruz Mts., and is almost all included within western Santa Clara, northern Santa Cruz, and southernmost San Mateo Counties. It is separated from the northern populations by most of San Mateo and all of San Francisco Counties south of the Golden Gate, and by Marin County on the north, although it is rather expected that *flavipunctatus* will eventually be found in Marin County.

Acknowledgements.—We wish to thank Mr. J. R. Slevin of the California Academy of Sciences and Mr. Thomas Rodgers, formerly of the Museum of Vertebrate Zoology of the University of California, for allowing us access to the collections of those institutions. The present study was made in the Natural History Museum of Stanford University, in 1940-41.

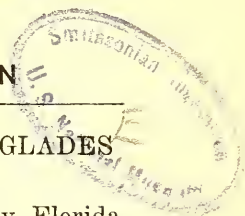
LITERATURE CITED

- BISHOP, SHERMAN C. 1943. *Hand book of salamanders*. Xiv+555 pp., frontispiece. Comstock Publ. Co., Ithaca, N. Y.
- COPE, EDWARD D. 1883. Notes on the geographical distribution of Batrachia and Reptilia in western North America. *Proc. Acad. Nat. Sci. Philadelphia*, 1883, pp. 10-35.
1889. The Batrachia of North America. *Bull. U. S. Nat. Mus.*, no. 34, 525 pp., 86 (minus 5) pls.
- DUNN, EMMET REID 1926. The salamanders of the family Plethodontidae. *Smith College Anniversary Series*, vol. 7, xii+441 pp., 3 pls. Northampton, Mass.
- ESSIG, E. O. 1931. *A history of entomology*. X+1029 pp. The Macmillan Co., N. Y.
- HILTON, WILLIAM A. 1948. *Aneides* from Oregon. *Herpetologica*, vol. 4, part 3, pp. 117-119.
- MYERS, GEORGE S. 1930. Notes on some amphibians in western North America. *Proc. Biol. Soc. Washington*, vol. 43, pp. 55-64.
- SLEVIN, JOSEPH R. 1928. The amphibians of western North America. *Occ. Papers California Acad. Sci.*, no. 16, 152 pp., 23 pls.
- STORER, TRACY I. 1925. A synopsis of the Amphibia of California. *Univ. of California Publ. Zool.*, vol. 27, 308 pp., 18 pls.
- VAN DENBURGH, JOHN. 1895. Notes on the habits and distribution of *Autodax iverianus*. *Proc. California Acad. Sci.*, ser. 2, vol. 5, pp. 776-778.
- WOOD, WALLACE F. 1936. *Aneides flavipunctatus* in burnt-over areas. *Copeia*, 1936, no. 3, p. 171.
1939. Amphibian records from northwestern California. *Copeia*, 1939, no. 2, p. 110.

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OF THE
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A NEW MINK FROM THE FLORIDA EVERGLADES

BY W. J. HAMILTON, JR.



During biological investigations in Collier County, Florida, I have made efforts to secure mink, which have been reported in the cypress swamps of the Everglades. A single specimen, victim of highway traffic, was taken in the late winter of 1947. This individual differs markedly from the mink of northern Florida and is herewith described as

Mustela vison evergladensis, subsp. nov.

Type locality.—Tamiami Trail (U. S. Route 94), 5 miles southeast of Royal Palm Hammock, Collier County, Florida.

Type specimen.—Female adult, skin and skull; No. 3850 Cornell University Museum; collected March 7, 1947, by William J. Piper.

Range.—Unknown, but presumably the cypress and mangrove swamps of the Florida Everglades and Ten Thousand Islands.

Diagnosis.—A small dark, silky furred mink. Color approximating *Mustela v. vison* but darker, particularly the head and throat. White chin spot absent. Tail dark brown, the distal half darker. This small mink is very distinct from *Mustela vison lutensis* of the north Florida salt marshes, both in size, color, and pelage. Contrasted to the coarse yellowish brown fur of *lutensis*, *evergladensis* has a soft dark dense pelage. The dorsal part of the neck is streaked sparingly with white hairs, a characteristic, presumably, of age. *Evergladensis* differs from *Mustela vison vulgivagus* in its much smaller size and lighter dentition. The color is somewhat darker than in *vulgivagus*.

Measurements.—The type measures: Total length, 441; tail vertebrae, 137; hind foot, 48. The skull, although badly crushed, indicates the following characteristics: greatest length, 51; condylobasal length, 48 (both measurements from skull before cleaning); length of mandible, 33; length of upper molar row, 15; length of lower molar row, 17.3. The cheek teeth are similar to typical *vison*, the last molar being somewhat smaller in the Florida form; these teeth are much smaller than in *lutensis*.

Remarks.—Mink are presumably scarce in the tropical region of Florida. Ransome I. Page informs me that a mink was holed by dogs some years ago a few miles south of Naples, Florida. William Piper, who took the type, has spent a lifetime in the Everglades as a professional collector and has seen not more than five mink, all within six miles of the point where the type was taken. Diligent inquiry only serves to indicate the relative rareness of the mink in the southern part of the Florida Peninsula. The type is a nursing female, with six swollen mammae, indicating that mating occurs in the Everglades region during January, at least a month earlier than in northern latitudes. Mink apparently do not occur in the central part of the Florida Peninsula. Hide dealers in Orlando, Florida have no knowledge of this animal occurring in the central part of the Peninsula. While they handle many hundreds of raw furs annually, mink have never been presented to these buyers.

